

forays, the Muruts, when not thus engaged, struck the author as being exceedingly gentle and extraordinarily peaceful in their home life, so much so, indeed, that during the whole of her sojourn among them not a single "family jar" was witnessed. Although, like most Malays (in the wider sense of that term), the Muruts are somewhat indolent in their nature, yet they collect considerable quantities of camphor, and grow such agricultural and garden produce as is required for all their wants, inclusive of material for clothes, while they are accomplished hunters and fishermen.

We have directed special attention to the account of the Muruts, as being the most interesting in the volume; but all the chapters, including those relating to the west coast of Africa, are well worthy of perusal, and the book may be heartily commended to all our readers.

R. L.

REPORT OF THE GEOLOGICAL SURVEY.¹

WE are glad to welcome the annual report of the director of the Geological Survey upon the work carried on by his staff and himself during the year 1904. It gives not only an account of the areas surveyed and the maps issued, but affords an insight into the new methods of research rendered possible and necessary by the advance of scientific knowledge. It is clear that, although maps showing the distribution of the rocks over the whole of the British Isles have been published, the survey is by no means complete, nor do we see that it can ever be considered as complete until all the resources of scientific investigation can be pronounced to be at an end. With regard to the maps themselves, much of the earlier work was put upon maps published as far back as 1819. Chemistry and physics, the appliances at the disposal of the petrologist, and the knowledge acquired by the palæontologist are all advancing with rapid strides, and we see on reading such a work as the annual report of the director of the Geological Survey how they are all brought to bear upon the economically important questions of identification of strata and utilisation of the resources buried in the earth.

One cannot often walk over the ground and detect at once what is of value in it, but a knowledge of the association of minerals may tell one that a certain vein may lead to a metalliferous lode. Hard earned experience and a well trained eye recognise a band of rock containing certain varieties of plants or animals. It may be itself of no use commercially, but yet be of the greatest value economically if it has been ascertained that it occurs in constant relation to some other stratum which is of value. Thus we find on p. 5 of the summary that "the search for coal beneath the Triassic rocks of the Midlands which has been going on for many years and is likely to continue, has brought into great prominence the importance of an accurate knowledge of the subdivisions of the upper unproductive measures"; and again, p. 11, "A seam of coking coal has been worked to the south-east of Alton. The depth and other details have not yet been ascertained, but fossils, similar to those got by Mr. Wedd in the brickpits at Bullbridge, Ambergate, have been obtained from the tip heap, and it is hoped that their distinctive character may enable this seam to be traced over a considerable area."

When we bear in mind that the discovery of one good seam of coal would probably repay the country the cost of maintaining the survey for many years,

let us hope that it will be one of the last institutions affected by any policy of retrenchment.

The first object in founding the survey, and the school and museum then wisely connected with it, was the promotion of scientific research with a direct aim at economic and practical results, and every page of the report before us tells how admirably this object is being carried out. The surveyors note the occurrence and character of the various building materials met with—the stone, brick, and cement produced in various localities; they record where road metal may be procured and discuss the sources of water supply, a subject which, having regard to its importance, might well have a strong staff told off for its investigation.

We find in the text or in an appendix useful analyses of various rocks and minerals, descriptions of methods of dressing ores, and a discussion of the conditions which affect the search for coal-bearing strata which are covered over by immense deposits of later date and irregular occurrence.

It is clear that no one can tell beforehand what will be directly productive of economic results in such investigations as lie before the geologist, and the country demands the encouragement of scientific research and the pursuit of knowledge even where no one could foresee any practical results. We find that the survey does take cognisance of the physical geography of each district examined, its ancient lines of drainage, its raised beaches, and also investigates many difficult questions of chemical, thermal, and mechanical metamorphism, and the petrology and palæontology of rocks not obviously productive of anything of commercial value. The treatment of all these questions is arranged first of all geographically, so that anyone may turn to the description of his own district, and then stratigraphically, and the names of those who are responsible for the different statements are given in the margin. When we realise that this is the report of one year's work, we may look forward to the development of the summary into valuable treatises of great practical and scientific value.

NOTES.

At a meeting of the Röntgen Society on Thursday next, January 4, Prof. F. Soddy will deliver the presidential address upon "The Present Position of Radio-activity."

THE death is announced of Mr. F. W. Burbidge, curator of the botanical gardens of Trinity College, Dublin. From a short obituary notice in Wednesday's *Times* we learn that Mr. Burbidge was born in Leicestershire in 1847, and, after studying horticulture at Chiswick and at Kew, afterwards combined a good deal of experience as a practical gardener with some adventurous journeys to Borneo and the East Indies as a collector of birds and orchids. He was appointed in 1879 to be the curator of the gardens at Lansdowne Road, Dublin, which belong to the Board of Trinity College, and are attached to the scientific side of the college. He filled his office with distinguished success, and made many important contributions to the literature of his subject, on which he was a recognised authority. He was a member of the Royal Dublin Society and of the Royal Horticultural Society, and in 1889 the University of Dublin conferred upon him the degree of Master of Arts, *honoris causa*. In addition to many articles in periodicals, Mr. Burbidge was the author of several books upon horticultural subjects.

At a recent meeting of the Wellington Philosophical Society, as reported in the *Wellington Evening News* of November 4, an important discussion took place with re-

¹ "Summary of Progress of the Geological Survey of the United Kingdom and Museum of Practical Geology for 1904." (London: Printed for H.M. Stationery Office by Wyman and Sons.) Price 1s.

gard to the alleged sheep-killing habit of the New Zealand kea parrot. As is well known, this bird is commonly reported to cause the death of sheep—or to leave them in such a condition that death soon ensues—by pecking a hole in the side, and the alleged habit is accepted as a fact in ornithological and other natural history works. According, however, to investigations undertaken independently by a number of New Zealand gentlemen, the story is without a shadow of foundation. The observers included naturalists and estate agents, as well as others whose judgment must be regarded as equally trustworthy. The kea is a bird of unbounded curiosity, and it is suggested that the myth is probably due to this habit, some observer who had seen a kea inspecting the carcass of a defunct sheep or lamb having very likely jumped to the conclusion that the bird was the active cause of the animal's death. It is concluded that although the legend cannot be said to be completely disproved, yet there is not a scrap of evidence in its favour. Owing to its bad repute, the kea is in imminent danger of extermination.

THE ornithology of Oxfordshire, by Mr. Aplin, and notes on fishes taken at Yarmouth, by Mr. A. H. Patterson, are the subjects of the two articles in the December issue of the *Zoologist*. Mention of several birds new to the British list or of very rare occurrence in our islands is made in the notes column, the two new forms being the yellow-breasted bunting, from Norfolk, and the dusky thrush, from Nottinghamshire. A correspondent publishes a photograph of the skeleton of the fore-feet of a polydactyle cat, displaying duplication of the thumb on one side, and triplication on the other. Almost exactly similar conditions obtain in the feet of two such abnormal cats exhibited in the Natural History Museum.

THE December number of the *Naturalist* contains new regulations for the local protection of birds promulgated by the county councils of the North, East, and West Ridings of Yorkshire in response to a petition presented by the Naturalists' Union of the county. Among the more noticeable items are the extension of the close time for a previously scheduled list of species, the period now being from the last day of February to September 1; the total prohibition of the killing of a number of species mentioned in a second list for a period of five years; and total protection for a similar period of the eggs of a third list of species. Wild-bird shooting is entirely prohibited on Sundays, while two proclaimed areas are to be protected for a further five years. It is added that, in response to an appeal from the Union, the Bridlington Harbour Commissioners have prohibited the practice of firing at the birds on Bempton and Speeton Cliffs from passing pleasure-steamers.

Museum News (Brooklyn, New York), No. 5, opens with a dissertation on the proper mode of visiting museums, that is, in order to derive some benefit therefrom. Type descriptions of two exhibits are appended, one dealing with the eggs of the brant-geese and the other with the manati. The latter, we should say, is an excellent example of what a museum descriptive label ought not to be, for while manatis, dugongs, and rhytinas are all referred to, there is not a word to indicate how they are to be respectively distinguished. A novel practical exhibition—desirable or otherwise—has been added to the Children's Museum in Bedford. In a vessel of water are placed a few coins with an invitation to take one; but the coins remain, for in the water are a couple of charged wires, from which a severe electric shock is received.

FOUR papers on Cretaceous reptiles are included in the December number of the *American Journal of Science*. The two first of these are devoted to a couple of new representatives of horned dinosaurs (Ceratopsia) from the Laramie beds of Wyoming, discovered by the late Mr. J. B. Hatcher, for one of which the finder proposed the name *Triceratops brevicornis*, while to the second, which lacks the single nasal horn, Mr. R. S. Lull gives the new generic and specific title *Diceratops hatcheri*. A figure of a restored model of the head of the latter shows a creature strangely like a rhinoceros, save for the rudimentary condition of the nasal horn and the presence of a pair of horns above the eyes. We have now evidence of the existence of either one, two, or three functional horns in the Ceratopsia—features correlated by Mr. Lull with differences in the mode of attack of these giant reptiles. The one-horned form is supposed to have attacked in what the author describes as rhinoceros-fashion, *i.e.* with an upward thrust. Mr. Lull, however, appears to be unaware that neither of the Asiatic one-horned rhinoceroses uses its horn for fighting, but relies solely on its tusks! A mounted skeleton of a third species, *Triceratops prorsus*, in the U.S. National Museum, forms the subject of an illustrated paper by Mr. C. Schuchert. The fourth of the aforesaid series of reptilian papers is the first of a series by Mr. G. R. Wieland on Upper Cretaceous turtles, the forms dealt with in this instance being the small but thick-shelled Adocidæ (*Adocus* and *Agomphus*). The thickness of the shell may have been correlated with sublittoral habits as a protection against predatory dinosaurs.

THE four latest issues of the *Proceedings of the U.S. National Museum* comprise the description by Miss Richardson of a new species of the crustacean genus *Livoneca* from Panama (No. 1430); an account of the breeding habits and the segmentation of the eggs of the Florida pipe-fish (*Siphostoma floridæ*), by Mr. E. W. Gudger (No. 1431); notes on exotic earwigs, with descriptions of new species, by Mr. J. A. G. Rehn (No. 1432); and a list of fishes collected at Shanghai and Hong Kong in 1882–3, by Messrs. Jordan and Scale (No. 1433), containing descriptions of half a dozen species regarded as new to science. In the above-mentioned paper on the Florida pipe-fish, Mr. Gudger gives a detailed summary of the history of our knowledge of the breeding habits of pipe-fishes and their kindred, and then discusses those of the species under consideration. In all these fishes the ripe eggs are transferred from the oviducts of the female to a special brooding-pouch on the under-side of the abdomen of the male. In the case of the Florida species, when the eggs are ready for transference the male and female fishes swim round and round one another for a time, and then intertwine their bodies in the form of a double letter S, with the heads of each turned outwards. In this position the eggs are transferred from the ovary of the female to the pouch of the male, where the two are in contact, about a dozen eggs being received in the pouch, where they are presumably fertilised. The male then performs a series of evolutions for the purpose of "shaking down" the eggs into the end of the pouch, on the completion of which the process of transference is resumed. The eggs, which soon become fixed to the pouch, are hatched in ten days. Full details, with illustrations, are given of the segmentation.

THE first appendix to the *Kew Bulletin* for 1906 has put in an early appearance; it contains a list of seeds of hardy herbaceous plants, and of trees and shrubs available for exchange with botanic gardens or regular correspondents of Kew.

It has been recognised that in the case of the winter-greens, species of *Pyrola*, the seedlings possess some undiscovered peculiarity. In 1882 Kamienski described for the allied genus *Monotropa* the formation of a thread-like body out of which the flowering shoot arose. Ten years later Prof. J. Velenovsky announced that from the seed of *Monesis*, or *Pyrola uniflora*, there develops a primary body, a *procaulom*, from which the leafy shoot develops endogenously. Recently he has published an account of the seedlings of *Pyrola secunda* in the *Bulletin international de l'Académie des Sciences de Bohême*, October, in which he confirms his previous conjectures.

FARMERS in New Zealand are well instructed by the Department of Agriculture as to the wisdom of exterminating weeds, so that a discussion of the weed habit in plants by Dr. L. Cockayne, published in the *Canterbury Agricultural and Pastoral Association's Journal*, October, has its special interest. On cultivated lands the weeds are mostly aliens, but a number of indigenous weeds are spreading over pasture lands in different parts; they include *manuka* scrub, *Leptospermum*, cotton wood, *Cassinia leptophylla*, plantains, and species of *Acacia* that are distributed by means of their hooked burrs. The indigenous grass *Danthonia semiannularis* is a rare instance of an aggressive plant that possesses economic value.

As a point of some importance in connection with the stage at which grasses should be cut for fodder, Mr. H. H. Cousins gives in the *Jamaica Bulletin* (October) the results of chemical analyses made at different times. In the case of hay grass, *Sporobolus indicus*, cut after two weeks' growth, the albuminoids amounted to 10 per cent. of the dry weight, whereas after four weeks they barely reached 6 per cent.; a marked difference was also found in the hay of guinea grass, *Panicum maximum*, cut before flowering or during the fruiting stage. In the same number, in the course of a report on cocoa cultivation, Mr. Cradwick questions whether "fiddler" larvæ can attack undamaged and healthy trees; on this matter there appears to be a difference of opinion.

IN St. Lucia, according to the annual report for the year 1904-5 of the botanic and experiment stations, cacao planters are beginning to learn from the successful results shown on the experimental plots that a greatly improved yield can be obtained by systematic manuring and intense cultivation. Among products of secondary importance, the dwarf or Chinese banana, *Musa Cavendishii*, is receiving a trial, and the cultivation of vanilla is recommended. Mr. Hudson, the agricultural instructor, writing on the subject of supports for vanilla plants, selects the Liberian and a wild coffee plant, or the annatto, *Bixa orellana*, as the most suitable.

THE annual report for the year 1904-5 of the Board of Agriculture in Jamaica contains an account of numerous experimental plantations at Hope Experiment Station for testing varieties of bananas, plantains, cassava, tannias, citrus fruits, pineapples, and sweet potatoes. Of these crops cassava is of special importance, as it could be cultivated profitably on much land that is now lying waste, if central factories were erected for the purpose of manufacturing starch. In addition to the experimental plots, where sixty varieties of cane are on trial, the sugar industry is likely to benefit greatly by the central laboratory which is to be constructed. This will contain a room fitted up for analytical work, a fermentation laboratory, and an experimental distillery.

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It is becoming more and more evident that, even in minor earthquakes, the focus may be much more complex than the simple fissure or cavity accepted by earlier seismologists. Dr. C. Davison has familiarised us with twin foci in the small earthquakes of the British Isles, and now we have an account, by Dr. S. Arcidiacono, of Catania, in the *Bolletino della Società Sismologica Italiana*, of the Sicilian earthquake of June 14, 1904, which, though nowhere more than a feeble shock, showed no less than four separate centres of maximum intensity.

A PAMPHLET issued by Pre. Raffaello Stiatterì, from the geodynamic observatory of Quarto Castello, near Florence, deals with the determination of the distance of the epicentre of an earthquake from the duration of the preliminary tremors. He finds from his own observations that, for epicentres not more than 2000 km. distant, the distance in kilometres is 5.63 times the duration of the tremors, expressed in seconds. Prof. Omori, working in Japan, deduced a similar formula, but his factor was 6.54 for the same limit of distance. This is attributed, with what seems sound reason, to a difference between the constitution of the earth's crust under central Europe and that under the sea east of Japan; but the possibility is indicated that the difference may be partly attributable to Prof. Omori's instruments being less adapted for picking up the earliest tremors than those built and used by the Abbé Stiatterì since 1902.

AT Detroit, Michigan, large deposits of salt underlie the limestone and sandstone at a depth of 1500 feet. Boreholes have been put down through which brine has been pumped; but up to a year ago all attempts to sink shafts to mine the salt have proved failures owing to the sulphur and gases encountered. On February 20 a new shaft was begun, and has been successfully carried to the salt. Illustrations given in the *Engineering and Mining Journal* show that a crib was employed made of 12 by 12-inch timbers bolted together and made absolutely water-tight. This was forced from the top downwards to the salt, Portland cement being used between the crib and the rock. Two powerful ventilating fans were used for driving out the gases; but even then men could only remain in the shaft for a very short time without losing consciousness.

THE last issue of the *Transactions of the Nova Scotian Institute of Science* (vol. xi., part i.), although somewhat belated in publication, records a year's useful scientific work. The most important paper contributed is that by Prof. J. E. Woodman on the geology of the Moose River gold district in Halifax county. It formed part of an investigation into the pre-Carboniferous history of the gold-bearing series. The gold occurs in sedimentary deposits and in veins. In the former it is held chiefly in slates, almost all being in the form of sulphides. In the quartz veins, however, a large proportion is free within the zone of oxidation, and a small amount below it. Detailed descriptions of the veins are given, and the paper is accompanied by eighteen admirable maps and illustrations. Other papers deal with sections and analyses of Nova Scotian coals, by Dr. E. Gilpin; contributions to the study of hydroxylamine and its salts, by Mr. W. H. Ross; and details of about forty fungi determined by Mr. R. R. Gates from the vicinity of Middleton, in Annapolis county.

THE Engineering Standards Committee has issued, in the form of a pamphlet of sixty pages, a report on progress of work from January, 1901, to July, 1905. Originally formed with the object of standardising steel sections, its scope has since been greatly enlarged. The subjects dealt

with up to the present time include:—rolled sections; railway and tramway rails; locomotives for Indian railways; pipe flanges; screw threads; pipe threads; limit-gauges; railway rolling-stock material; tire profiles; steel castings and forgings for marine work; Portland cement; cast-iron pipes; generators, motors, and transformers; prime-movers for electrical purposes; physical standards; telegraph and telephone material; electric cables; electric tramway materials; electric automobiles; and electric plant accessories. The report recounts the results of the labours of the committee, and includes a list of the members serving on the thirty-five sectional committees, as well as a list of the publications issued. It is impossible to exaggerate the value of the work done, and the thanks of all engineers are due to the five technical societies who supplied the funds to inaugurate a work of such national importance.

WE learn from the November number of *Das Wetter* that the highest kite ascent on record was made at the aëronautical observatory at Lindenberg (Prussia) on November 25, an altitude of 21,100 feet being attained. In this ascent six kites were attached to each other, with a wire line of nearly sixteen thousand yards in length. The minimum temperature recorded was -13° F.; at starting the reading was 41° . The wind velocity at the surface of the earth was eighteen miles an hour, and at the maximum altitude it reached fifty-six miles an hour. Up to the time of this ascent the highest record by a kite was nearly 1100 feet lower, and was obtained by M. Teisserenc de Bort, from a Danish gun-boat, in the Baltic.

THE Journal of the Meteorological Society of Japan for October contains an article (in French) on the rainfall of Chemulpo. The Japanese observatory was only established in April, 1904; the observations on which the present paper is based were made by the Korean customs officers during eleven years, 1893-1903. The mean annual rainfall is 38 inches, of which 7.7 inches fell in July; 53 per cent. of the total amount fell in three summer months. The average number of rain-days is 89. The heaviest rainfall during one hour was 0.85 inch, in August, 1901. The average duration of rainfall is about six hours, the longest falls being in springtime.

WE have received from Dr. Hergesell, president of the International Aëronautical Committee, a summary of the ascents made during the four months May to August, in various countries, by kites and balloons. Only the heights reached are quoted—not the meteorological results, which will be published later on. The unmanned balloons obtained several records at heights exceeding 15,000 metres in each of the months:—in May, 18,490 metres, at Munich; in June, 20,620 metres, at Munich; in July, 20,000 metres, at Munich; on August 3, 25,800 metres, at Strassburg; on August 2, 15,230 metres, in the Atlantic, on the Prince of Monaco's yacht. In connection with the solar eclipse, ascents were made on the three days August 29-31. On the day of the eclipse, an altitude of 23,010 metres was reached at Munich. During the month of August several kite ascents were made in the North Sea by Mr. G. C. Simpson, under the auspices of the Royal Meteorological Society, and some valuable results were obtained, both as to temperature and humidity.

LORD BLYTHSWOOD and Mr. H. S. Allen contribute to the *Philosophical Magazine* for October an interesting investigation of Dewar's method of producing high vacua by means of charcoal. It is shown that it is only necessary to increase the size of the charcoal receptacle in order to produce a high degree of exhaustion in a large discharge

tube without the use of a pump. The method requires only moderate quantities of liquid air, and is particularly useful when it is desirable to avoid the presence of mercury vapour in the vacuum tube, as in the Geissler tubes used for spectroscopic analysis. A special investigation showed that the rate of absorption of the charcoal at any instant is proportional to the difference between the total amount of air absorbed and the amount which has been absorbed at the instant in question, that is, the rate is in a constant ratio to the quantity of air that will still be taken up by the charcoal. The constant is but little affected by alterations of the pressure under which absorption occurs.

THE residual electromotive force of the carbon arc is the subject of a paper by Mr. G. G. Becknell in the *Physical Review* (vol. xxi., No. 3). The circuit used was so arranged that the dynamo and galvanometer could be alternately joined in series with the arc gap, and it was found that the so-called residual current could be observed for more than ten seconds after the interruption of the arc. From the experiments it is concluded that the current can be attributed neither to a thermoelectric effect in the arc nor to one external to it. A description is given of the means by which the residual electromotive force and current are measured as functions of the time, and from the curves shown it is seen that the fall of the current is much more precipitate than that of the E.M.F., showing that the resistance of the arc increases very rapidly. An explanation is suggested by considering that a stream of corpuscles is freely emitted by both incandescent terminals, but more abundantly from the positive, and that these diffuse across the arc gap until the carbons have so far cooled down that the rate of production of the negative ions by the positive carbon no longer exceeds the rate of their production by the negative carbon.

MESSRS. F. VIEWEG AND SON have just issued a second revised and enlarged edition of Prof. F. Hofmeister's "Leitfaden für den praktisch-chemischen Unterricht der Mediziner," originally published in 1899.

MR. J. A. BARTH, Leipzig, has sent us a part of the second edition of the "Handbuch der Physik" edited by Prof. A. Winkelmann. This part is the first half of the fifth volume of the handbook, and in it Prof. F. Auerbach deals with electricity and magnetism. We await the remainder of the work before a review can be undertaken usefully.

MESSRS. A. GALLenkAMP AND CO., LTD., of Sun Street, Finsbury, E.C., are issuing a series of descriptive circulars giving full particulars of special arrangements of physical apparatus which they now make up for fundamental work in experimental science. The forms of apparatus have been carefully selected so that accurate results may be obtained by experiments with them.

NEW editions of parts of two valuable works on physics have lately been published by Messrs. F. Vieweg and Son, Brunswick. One is the first part of the first volume of the tenth enlarged and revised edition of Müller-Pouillet's "Lehrbuch der Physik und Meteorologie," edited by Prof. L. Pfaundler in cooperation with several other eminent German physicists and meteorologists. This part, by Prof. Pfaundler, contains the general introduction on the properties of matter, while the remainder is devoted to mechanics. The work will be completed in four volumes. The second part of the first volume of the seventh edition of Dr. J. Frick's "Physicalische Technik" has also been received. This work will be completed in two volumes, and notices of it and of the above mentioned treatise are best deferred until all the parts have come to hand.